GREAT RIVER ENERGY
17845 E. Highway 10
PO Box 800
Elk River, MN 55330-0800

FAX

Date 9/7/01

Number of pages including cover sheet 13

To:		**From:**	
Terry O'Clair		Mary Jo Roth	
North Dakota Department of Health		Great River Energy	
Phone	701-328-5188	Phone	763-241-2449
Fax Number	701-328-5200	Fax Number	763-241-6229
CC:	Lyle Witham		

REMARKS: ☐ Urgent ☐ For your review ☐ Reply ASAP ☐ Please comment

GREAT RIVER
ENERGY®

17845 East Highway 10 • P.O. Box 800 • Elk River, Minnesota 55330-0800 • 763-441-3121 • Fax 763-241-2366

September 7, 2001

VIA FACSIMILE
AND U.S. MAIL

Terry O'Clair, Director
Division of Air Quality
Environmental Health Section
North Dakota Department of Health
1200 Missouri Avenue
Bismarck, ND 58504-5264

RE: Great River Energy
Response to SO_2 Increment Information Request

Dear Mr. O'Clair:

Great River Energy has received a sulfur dioxide (SO_2) increment information request, addressed to Mr. Jim VanEpps and dated July 3, 2001, from Mr. Jeff Burgess, director of the air quality division for the North Dakota Department of Health (NDDH). In accordance with the schedule agreed to on August 20, 2001 by Mr. Lyle Witham of the North Dakota Attorney General's office and me, the following is Great River Energy's response to the information request. It is our understanding that Mr. Burgess is no longer with the NDDH and so we are submitting our response to you, the current director of the division.

The information request asks for comments regarding the appropriate methodology for calculating baseline emissions, and calculation of historical 3-hour, 24-hour and annual baseline emission rates of SO_2 from Great River Energy's North Dakota facilities. Great River Energy (GRE) has two power plants located in North Dakota. These plants are Stanton Station (which consists of Unit 1 and Unit 10), located near Stanton, North Dakota, and Coal Creek Station (which consists of Unit 1 and Unit 2), located near Underwood, North Dakota. GRE does not own or operate any minor emission sources in the state of North Dakota. Stanton Station Unit 1, which was constructed and began operation prior to the major source baseline date of January 6, 1975, is considered a "baseline" emission source. Stanton Station Unit 10 was permitted and began operation after the SO_2 major and minor source baseline dates and is not a "baseline" emission source. Based on available information, it appears that Coal Creek Station may not be considered a "baseline" source of SO_2 emissions.

As you are aware, GRE does not have certified SO_2 continuous emissions monitoring data available for Stanton Station Unit 1 prior to 1995. Accordingly, development of historical emission rates of SO_2 may be based on a number of variables including firing capacity, firing rate, fuel quality, applicable emission limits, emission test results, and emission factor characteristics. Much of the information needed to respond to the information request dates back more than 25 years and is not information that GRE is required to keep under any applicable law or permit. GRE has undertaken a diligent effort to locate and identify documents that may assist in responding to this information request. This effort has included identification and review of more than 20 boxes of company records as well as review of the state's files concerning these facilities. While we believe our efforts to respond to the information request have been comprehensive, given the large number of potentially relevant documents, the age of many of these documents, limitations regarding indexing and storage of the documents, and the short time-frame to respond to this information request, we reserve our right to provide the NDDH with additional documents or information that may be identified during our continued review of documents and ongoing efforts to provide the NDDH with all relevant information.

I. Calculation of Baseline Emissions For Stanton Station Unit 1

With respect to Stanton Station Unit 1, there is no continuous emissions monitoring data and GRE has not identified any performance or engineering test data for the years 1974 through 1977. Thus, there does not exist *any* actual measurement of facility emissions at the SO_2 minor source baseline date (December 19, 1977). Accordingly, baseline emissions must be determined on some basis other than actual measured emissions.

A. "Allowable Emissions" Should be Used to Determine Baseline SO_2 Emissions from Stanton Station

The NDDH has requested comment regarding the best information and appropriate methodology for calculating baseline emissions. Further, the NDDH has requested a description of "law, rule, case law, federal guidance or any other information" that supports use of allowable emissions as baseline emission rates. Based on review of applicable law and available information, GRE believes that baseline SO_2 emissions for Stanton Station Unit 1 should be based on allowable emissions as of the minor source baseline date (December 19, 1977).

Allowable emissions for Stanton Station Unit 1 should be based on the facility's 1800 million-British-thermal-units-per-hour (mmBtu/hr) heat input rating and the 3 pounds of SO_2 per million Btu emission limit under NDAPL § 23-35-06.120 that applied to the facility on December 19, 1977. This limit, which was established considering allowable emissions of existing power plants and specifically considered the allowable emissions from Stanton Station, was established as part of the control strategy for the state and included in North Dakota's initial State Implementation Plan that was approved by the United States Environmental Protection Agency (EPA) on May 31, 1972.

i. North Dakota Law Provides for Use of Allowable Emissions for Establishing Baseline Emissions

The state of North Dakota, based on NDAC 33-15-15-01.1.d.(1)(a), includes in the baseline concentration "actual emissions representative of sources in existence on the applicable minor source baseline date." NDAC 33-15-15-01.1.a(2) defines "actual emissions," "in general," to include those emissions that are "representative of normal source operation." Further, under the definition of "actual emissions," the state has the authority to "presume that source-specific allowable emissions for the unit are equivalent to the actual emissions of the unit." Thus, North Dakota law provides that allowable emissions may be used for determining baseline SO_2 emissions.

ii. Allowable Emissions are Representative of Facility Design and "Normal Operation" of the Facility

At the time of the minor source baseline date, Stanton Station Unit 1 had a heat input rating of 1800 mmBtu/hr. This firing capacity was established to accommodate anticipated load. As is the case with most electrical generation facilities, operation fluctuates over time based on demand and other factors. Allowable emissions, which reflect the design and expected operation of the facility, are "representative" of "normal operation" of Stanton Station Unit 1 and should be used to determine baseline emissions for this source. Such an approach is consistent with the intent that increment consumption come from new sources or modifications that occur after the baseline has been set, rather than from the fluctuating production of existing plants.

iii. Use of Two-Year Estimated "Actual" Emissions for Stanton Station is not "Representative of Normal Source Operation" and Results in an Artificially Low Baseline Concentration

Use of a "two-year period" prior to the minor source baseline date, for establishing baseline concentration for Stanton Station, would create an artificially low baseline concentration and would not be representative of "normal source operation," source operation prior to the baseline date, or source capacity at the baseline date. Actual SO_2 emissions from the facility are affected by numerous variables, including electrical demand, plant maintenance, and fuel quality. Estimated SO_2 emissions are further affected by variables such as emission factor characteristics. Selection of a "two-year period" for estimation of emissions for establishing baseline will artificially reduce baseline such that, even without any modification of the plant, the facility could be viewed as consuming increment based on nothing more than normal emissions fluctuation.

For example, estimated annual SO_2 emissions from Stanton Station Unit 1, as calculated by GRE, are as much as 52% different for a given year and have ranged from 5,832 tons/year (1978) to 12,144 tons/year (1990). Further, if 1977 and 1976 were selected as the baseline period, the average annual emissions from that two-year period would be 7,927 tons/year. Estimated actual emissions in 1981 (7,984 tons/year) would then be viewed to consume increment, even though actual emissions from the facility, before the

baseline date, in 1974, were more than 1,300 tons greater (9,332 tons/year). Similarly, comparison of hourly emission rates based on estimated emissions could be interpreted to consume increment even though the facility continued to operate normally. Such an approach, however, is counter to congressional intent, and EPA's own statements, regarding how baseline should be calculated for existing facilities. As noted in the legislative history of the Clean Air Act:

> "Baseline pollution level" is the level of pollution calculated to exist assuming plant capacities as of January 1, 1975 . . . . The committee emphasizes that the "baseline pollution level" includes existing sources' emissions calculated on the basis of total plant capacity. For example, even if a plant has been operating at 60 percent capacity, its total capacity for emissions is included in the "baseline . . . . Furthermore, no rollback in emissions from existing plants would be required under the provisions of this section.

H.R. Rep. 95-1175, 95th Cong., 1st Sess. (emphasis added). The House Report repeatedly makes clear that "total plant capacities" are to be included in the baseline concentration:

> The baseline pollution level includes the ambient concentrations calculated to exist, assuming total plant capacities in being on January 1, 1975. . . [and] additional plant capacities for new sources which receive new source permits prior to date of enactment . . . . Therefore, the bill's definition of baseline level authorizes the "grandfathering" of not only all existing industrial capacity, but also of new capacity under construction. . . .

H.R. Rep. 95-1175, 95th Cong., 1st Sess. (emphasis added). Similarly, EPA, in the June 19, 1978 preamble to the New Source Review regulations, stated that:

> Actual emissions also includes into the baseline any future increases in hours of operation or capacity utilization as they occur if such are allowed to the source as of [the major source baseline date] and if the source could have been reasonably expected to make these increases on this date.

43 Fed. Reg. 26388, 26400 (June 19, 1978). In the August 7, 1980 preamble to amendments to the regulation at issue, EPA further refined this policy and provided:

> If a source can demonstrate that its operation after the baseline date is more representative of normal source operation than its operation preceding the baseline date, the definition of actual emissions allows the reviewing authority to use the more representative period to calculate the source's actual emissions contribution to the baseline concentration. EPA thus believes the definition of actual emissions to allow any reasonably anticipated increases or decreases genuinely reflecting normal source operation to be included in the baseline concentration.

45 Fed. Reg. 52676, 52714 (August 7, 1980) (emphasis added). Accordingly, Congress intended, and EPA has reiterated, that increment consumption come from *new* sources

and modifications after the baseline date, rather than from production fluctuations of existing baseline facilities. Use of two-year estimated emissions, however, would result in the contrary. Accordingly, given the lack of any actual emission data from the facility during the baseline period and the existence of an applicable source-derived SO_2 limit, baseline is best established for Stanton Station Unit 1 by using allowable emissions from this unit, rather than the two-year estimated "actual" emissions approach.

Use of allowable emissions, based on the facility's 1800 mmBtu/hr heat input rating and the 3 lbs SO_2/mmBtu emission limit, as of the minor source baseline date (December 19, 1977), results in the following 3-hour, 24-hour and annual baseline emission rates for Stanton Station Unit 1:

3-hour average (lbs/hour)	24-hour average (lbs/hour)	Annual (tons/year)
5,400	5,400	23,652

B. Any Estimate of Baseline "Actual" Emissions For Stanton Station Should Be Based on Best Available Information

Although baseline emissions should be based on allowable emissions, as discussed above, to the extent that any actual emissions estimate is developed for Stanton Station Unit 1, that calculation should be based on best available information. The NDDH provided estimated "actual" SO_2 emissions for Stanton Station Unit 1, for the period from 1974 through 1977, with the July 3, 2001 information request. GRE has reviewed these emissions estimates and researched internal and agency records to determine the validity of the NDDH's estimates. Based on this review, GRE believes that the estimate of actual emissions for Stanton Station, for the period of 1974 through 1977, should be higher than initially estimated by the NDDH.

i. The Basis of the NDDH's SO_2 Emissions Estimate

The NDDH's estimate of "actual" SO_2 emissions is based on information included in the Stanton Station Annual Emission Inventories from 1974 through 1977, and use of the current AP-42 emission factor for lignite combustion. Annual emissions estimates were based on the actual tonnage of lignite burned in the year and the average sulfur content for the year. Maximum hourly emission estimates were based on the maximum firing rate and the maximum sulfur content for the year. Annual tonnage of lignite burned, average annual sulfur content, maximum firing rate, and maximum sulfur content for all calculations were taken from the 1974-1977 Annual Emission Inventories for Stanton Station.

As part of GRE's effort to respond to this information request, the company has worked to identify documents and review the accuracy of the variables identified above. To date, the company has not been able to locate any detailed data regarding annual or short-term firing rates, or sulfur content, or regarding the methodology for assessing such variables, for the years 1974 through 1977. Annual reports submitted to the Rural Electrification Administration (presently the Rural Utilities Service), however, include annual firing

rates that are generally consistent with the Annual Emission Inventory reports for the baseline period. Other documents indicate fuel sulfur content that is generally consistent with the range of sulfur content included in the Annual Emission Inventories. Accordingly, at this time, our review of available records suggests the values used by the NDDH from Annual Emission Inventories for firing rates and fuel quality are reasonable for the years 1974 through 1977.

ii. Use of a Facility-Specific Sulfur Multiplier Based on CEM Data Provides a More Accurate Estimate of Past SO_2 Emissions

As noted above, the NDDH, in estimating past emissions, used the fuel quality and firing rate data from Annual Emission Inventories in conjunction with an AP-42 emission factor (i.e., $SO_2 = 30S$). The AP-42 emission factor is comprised of two variables; fuel sulfur content, and a sulfur conversion efficiency factor. The sulfur conversion efficiency factor (referred to herein as the "sulfur multiplier") estimates the amount of sulfur in fuel that ultimately will be emitted as SO_2. The multiplier used in the NDDH's initial calculations is 30. This factor, as is the case with AP-42 emission factors, is based on an average derived from lignite-fired plants, and does not necessarily represent the actual emissions of a particular facility.

GRE, based on the continuous emission monitoring data from 1995 through 2000, has evaluated the validity of the sulfur multiplier for Stanton Station Unit 1. Based on this facility-specific evaluation, GRE determined a more appropriate facility-specific sulfur multiplier than the generic multiplier included in AP-42.

a. Annual SO_2 Emissions Estimate Based on the Facility-Specific Multiplier

Review of Annual Emission Inventories indicates that fuel characteristics pertinent to SO_2 emissions generally have been similar throughout the operation of the facility. Attachment A includes a summary of fuel quality data as reported in the Annual Emissions Inventory reports for the years 1974 through 2000. Accordingly, based on five years of available continuous emissions monitoring data, the multiplier that should be used in estimating actual annual emissions for Stanton Station Unit 1 is 33.14. Set forth in Attachment B is a table that summarizes the basis for this annual multiplier. Use of this multiplier results in the following estimated annual SO_2 emissions, for Stanton Station Unit 1, for the following years:

Year	Estimated Annual SO_2 Emissions (tons/year)
1974	9,332
1975	8,382
1976	8,037
1977	7,817

b. Short-Term SO_2 Emissions Estimate Based on the Facility-Specific Multiplier

GRE also has assessed validity of the emission factor multiplier on a short-term basis, again using data from the Stanton Station Unit 1 continuous emissions monitor. Readily available short-term SO_2 CEM data from the third quarter of 1998 through the second quarter of 2001 was evaluated. During this period, the maximum 3-hour and 24-hour emission rates occurred on December 22, 1999. Combining the Stanton Station continuous emissions monitoring data with the daily average sulfur content and an estimated firing rate, GRE calculated a short-term emission factor multiplier. The CEM data and other basis for calculation of the short-term multiplier are summarized in Attachment C. Use of the facility specific CEM-based multiplier of 45 results in the following estimated short-term SO_2 emission rates, for Stanton Station Unit 1, for the following years:

Year	Estimated Hourly Emission Rate (lbs/hour)
1974	5,103
1975	5,499
1976	5,711
1977	5,031

As indicated in Attachment C, the hourly multiplier is greater than 40. GRE believes this factor of greater than 40, which is theoretically impossible, reflects a flaw in EPA's flow measurement methodology and/or may be attributable to fuel sampling, which may not be representative of the actual hourly sulfur content and heating value of the fuel. Nevertheless, because this multiplier is based on actual hourly data from Stanton Station, rather than the generic average number included in AP-42, GRE believes a multiplier of 45 presents a more accurate assessment of facility emissions. GRE also believes, to the extent that baseline emissions are to be compared to present-day emissions as measured by the SO_2 CEM, such an adjustment is necessary to insure a fair "apples to apples" comparison of historic and present-day emission rates.

II. Increment Expansion and Stanton Station Unit 10

On May 1, 1979, the NDDH issued a construction permit for Stanton Station Unit 10. This permit limits the total SO_2 emission rate from Unit 1 and Unit 10 to 4,416 lbs/hour averaged over a 36-hour period. The 36-hour averaging period was changed by the NDDH, on April 25, 1994, to a 24-hour averaging period. Because this emission limit reduces the allowable SO_2 emissions from Stanton Station (Unit 1 and Unit 10) below the baseline SO_2 emissions for Stanton Station Unit 1, as discussed above, this permit limitation expands available increment.

EPA has long recognized that increment expansion may occur where, following the baseline date, a source limits its emissions through more restrictive permit terms. As noted by EPA in the June 1978 preamble to the New Source Review regulations:

> Reductions in the baseline emissions of sources existing [at the baseline date] generally expand the available PSD increment(s) . . . any renegotiated emission limits more restrictive than those previously permitted will count toward expanding the PSD increment available.

43 Fed. Reg. at 26400-26401. In the August 7, 1980 preamble to the New Source Review regulations, EPA also noted that "emissions reductions after the baseline date increase available increment." See 45 Fed. Reg. at 52720. Similarly, EPA's New Source Review Workshop Manual provides that:

> The amount of available increment may be added to or "expanded" in two ways. The primary way is through the reduction of actual emissions from any source after the minor source baseline date. Any such emissions reduction would increase the amount of available increment to the extent that ambient concentrations would be reduced.

United States Environmental Protection Agency New Source Review Workshop Manual at C.10. Accordingly, the SO_2 emission limit in the May 1, 1979 construction permit for Stanton Station Unit 10, expands available increment.

III. Conclusion

The NDDH's information request asks for comments regarding the appropriate methodology for calculating baseline emissions. In response, Great River Energy has explained why use of allowable emissions for calculation of baseline emissions is appropriate under North Dakota law, necessary to prevent an artificially low baseline concentration, supported by legislative history and EPA preambles, and is most "representative" of "reasonably anticipated" emissions and "normal operation" of GRE's Stanton Station Unit 1.

The information request also asks for calculation of historical 3-hour, 24-hour and annual baseline emission rates of SO_2 for any baseline facilities. Great River Energy has provided this information for Stanton Station Unit 1, based on allowable emissions.

Finally, the information request provides an "actual emissions" estimate for Stanton Station Unit 1, based on an AP-42 emission factor, and asks for comments regarding any "more appropriate methodology" for estimating such emissions. In response, Great River Energy has developed a facility-specific sulfur multiplier based on CEM data from Stanton Station Unit 1 and has corrected the NDDH's short term and annual SO_2 emissions estimates to reflect the facility's measured sulfur conversion efficiency. Although allowable emissions should be used to establish the baseline concentration of SO_2, to the extent that increment consumption is assessed comparing emissions estimates

from the minor source baseline date to present-day CEM data, use of the facility-specific sulfur multiplier is necessary to insure a fair comparison.

We trust that the information provided herein satisfies the July 3, 2001 information request. If you have any questions, please call me at (763) 241-2449.

Sincerely,

GREAT RIVER ENERGY

Mary Jo Roth, Manager
Environmental Services

Attachments

c: Lyle Witham
Mark Strohfus
Jim Mcnnell, ELG